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before or at the time the walls gave way, the wind forced in some portion of the south wall, as a window or door, thus probably accounting for the outward pressure on other walls." The most important observation in connection with these exploded houses, however, was the record of a barograph, which just at this moment showed a remarkable rise in pressure. In the Louisville tornado, also, a barograph within a mile or two of the track showed first a slight sudden fall and recovery, due probably to the wind, and afterward the tornado-rise, as at St. Louis. This evidence is cumulative; and when we consider that the wind blows away from the tornado in front, and that of two similar objects standing side by side, one very heavy and the other light, the former is swept away while the other remains untouched, the evidence seems almost conclusive that there is no diminution of pressure in a tornado. It is probable that there is no fact in the whole observation or make-up of a tornado of such extreme importance as this, and it will be touched upon again in an explanation of a seeming rush of objects into the funnel. It will undoubtedly be thought, that, after all that has preceded, we really know very little of the mechanism of a tornado. This is true; but, if we have advanced far enough to be able to say what it is not, we may congratulate ourselves, and feel that our labor has not been entirely in vain.

H. A. HAZEN.

THE MANUFACTURE OF OZONE.

A COMPANY has been formed in Berlin for supplying the necessary plant for the conversion of oxygen into ozone on a larger scale than has hitherto been attempted, and the idea is gaining favor in many quarters that ozone can be economically employed for many sanitary purposes, says London *Industries*. Steps are being taken for extending the operations of the company to New York and London, as they have secured the patent rights for certain improvements in the electrical production of ozone from atmospheric oxygen in most countries. The Berlin doctors have repeatedly employed ozone, with very satisfactory results, in individual cases, and recently the company above alluded to have placed on the market a so-called ozonized water, which is stated to be a solution of ozone in that liquid. It is, however, well known that ozone is not very soluble in water, and that it readily undergoes decomposition, forming hydrogen peroxide and oxygen. The commercial name for this new antiseptic is "antibacterikon," and it possesses remarkable oxidizing properties. When added to water containing any appreciable quantity of living organic matter in the dark, it at once causes a phosphorescent appearance, and the organisms are completely destroyed in a short time. Such ozonized water is stated to have a faint metallic taste, and is used for producing sterilized water, or sterilized fluids, for bacteriological research. At present the ozone is manufactured from oxygen obtained by heating pyrolusite in the old way; but of course, with a greater demand, the Brin's oxygen process could be employed. The conversion takes place in a Siemens tube, or series of Siemens tubes, which do not differ essentially from the original form of ozonizer. The electric discharge is made by a Ruhmkorf coil in the usual way, or an accumulator is employed and a mercury contact breaker. It is proposed that ozone should be produced in this manner in large manufactories, and thus contribute to their sanitary improvement. Dr. Förster of Berlin has recently urged the importance of endeavoring to supply a small quantity of ozone to the air of towns and other thickly populated districts, and the company believe that their system can be worked economically and at the same time produce very satisfactory results from a hygienic point of view. It has been pointed out that many epidemics, e.g., influenza, appear to take place at those seasons of the year when the atmospheric ozone is at a minimum, and it is thus argued that

an artificial supply of this gaseous oxidizing agent would possibly prevent, and at any rate considerably modify, such outbreaks of disease.

THE OIL-FIELDS IN NEW ZEALAND.

The New Zealand Government attach a great deal of importance to the indications of extensive oil fields in Taranaki. The report of the inspecting engineer of the mines department, who has made a special examination of the territory at the instance of the government, says the *Australasian Journal of Commerce*, is strongly confirmatory of the presence of mineral oil. In the neighborhood of New Plymouth there are many surface indications, particularly along the shore, gathered under bowlders and floating on the water. Farther inland the water gathering in the wells which are sunk is found to have a strong taste and smell of petroleum, so as to be quite unfit for drinking. If all these indications should turn out to be well founded, and oil be discovered in paying quantities, the find will be of great value to New Zealand in many ways, the most important of which, perhaps, is as a fuel for smelting purposes. Vast quantities of iron sand — according to the "New Zealand Year Book," a sand formed by the grinding-up of iron ore by the action of the waves — lie for hundreds of miles along the coast of the North Island; and this pulverized ore is practically worthless at present from lack of a sufficiently cheap fuel to smelt it. Should oil be obtained in such close proximity to these supplies of ground iron ore, a new and important industry may be developed into large proportions. Such, at least, is the hope of those who are investigating the matter on the spot. Independent of this, however, a new and extensive oil-field in the South Pacific would speedily become the source of supply for the whole of Australasia and the entire East. New Zealand would become an active competitor with the Baku wells, even if the Russian supply should falsify present indications of failure, and continue. The proximity of the supposed New Zealand field to the coast and port of New Plymouth would give it an advantage over both Russian and American oils in lessening the cost of both crude and refined on shipboard.

THE USE OF OIL.

ATTENTION is called by the United States Hydrographic Office to the fact that the Chamber of Commerce of Bordeaux, France, has offered a series of prizes in order to induce masters and officers of vessels to make thorough trial of the use of oil at sea, especially as regards the best way to use it and the practical benefits to be derived from such use. There are three sets of prizes, each set consisting of a first prize of 200 francs (\$40) and a second prize of 100 francs (\$20), to be awarded for the best reports received by Jan. 31, 1891, based upon actual experience. Programmes for the three competitions are as follows:—

1. STEAMERS.—Trials of the use of oil must be made under various conditions, particularly the following: heavy head sea, heavy quartering sea, towing in bad weather, engine or rudder disabled.

2. SAILING-VESSELS.—Trials to be made under various conditions, but especially when crowding sail with a strong wind abeam.

There must also be considered, in connection with the first and second competitions, the use of oil in lowering and hoisting boats, taking a pilot aboard, saving life at sea, riding out a gale in an unprotected anchorage, loading and unloading in a seaway, wearing and tacking ship.

3. FISHING-VESSELS, PILOT-BOATS, YACHTS, LIFEBOATS, etc.—Experiments in using oil when crossing bars, landing in a surf, etc.

GENERAL RULES FOR THE COMPETITIONS.—Each experiment must be described fully as soon as possible, and an account inserted, under the proper date, in the vessel's log book. In the case of fishing-vessels and pilot-boats, however, this may be dispensed with; but upon return to port a full statement must be made to the maritime authorities. Full details must be given regarding the direction and force of the wind, the state of the sea,

and the condition and speed of the vessel. There must be stated, also, the position and character of the apparatus for the use of oil, the amount of oil used per hour, and the kind of oil used, according to the temperature of the water.

As stated above, each of these three competitions closes Jan. 31, 1891, by which time all reports must have been handed in to the Chamber of Commerce, Bordeaux, France. The published programme makes no specifications as to the nationality of the competitors or the language to be used, and the competition is therefore understood to be open to any one, subject only to the rules stated above, which should be carefully adhered to. The Hydrographic Office will gladly receive and forward any reports offered in competition, whether sent to Washington or handed in at any branch hydrographic office.

It will be noticed that it is the desire of the Bordeaux Chamber of Commerce to encourage the use of oil by masters of vessels, and the prizes are offered with this end in view. Reports are wanted regarding actual trials undertaken and reported as described above.

NOTES AND NEWS.

A PIECE of crown glass forty inches in diameter and two inches and a half thick has been shipped from Paris to Clark Brothers of Cambridge, Mass. It is intended for a forty-inch object-glass of a telescope for the University of Southern California, exceeding in size the Lick telescope. About two years' careful labor will be required to convert the rough glass into a finished lens.

— At a recent meeting of the American Meteorological Society in Washington, resolutions were adopted favoring the recognition of the eminent services of American electricians by perpetuating their names in the nomenclature of electrical units. In the names of units thus far adopted the names of Americans, such as Franklin and Joseph Henry, have not been recognized. It is proposed, as a beginning, that at the electrical conference to be held in this country in 1892 the name of Henry, or some modification of it, be given to the unit of self induction, he having been the first to investigate that phenomenon, and his investigations having been more complete than those of other electricians before or since.

— A special aim of those connected with the Wharton School of Finance and Economy at the University of Pennsylvania has been for some time past the securing of a complete series of the laws of all countries. Such an undertaking it requires scores of years to complete. In this department, however, the Wharton School library has already made a good beginning. There has been presented to it a set of the Prussian Statutes at large, including the years 1806 to 1886. There are to be found all the laws of the new German Empire, from its creation in 1866 down to 1886; a collection of works on German constitutional and administrative laws; and a work upon the public administration of Austria, by Ulbrich.

— Professor Edmund J. James, of the University of Pennsylvania, will present a paper before the American Academy of Political and Social Science on a new system of passenger fares. He will show that the railways of the United States, by their failure to adopt a reasonable and simple system of tariffs for passenger traffic, have prevented that development of this branch of their business which could have been expected, considering the natural tendency of Americans to travel. England has, relative to her population, nearly four times as many passengers on the railroads as the United States, though the character of the American people gives good reason to suppose that we should naturally have twice as many as England.

— The committee having in charge the interests, in this country, of the forthcoming Jamaica International Exhibition are working vigorously to insure a good representation of our manufactures and products. They have secured specially low freight rates for exhibits, and have made arrangements whereby exhibition goods will be returned free of freight from Jamaica, by the line on which they were shipped, on production of the outward bill of lading. Space will be reserved for empty cases, and all exhibits

will be conveyed from the wharf to the building free of charge. Exhibitors of apparatus requiring the use of water, gas, or steam, should state, on applying for admission, the quantity considered necessary. Those who wish to show machinery in motion must state the rate of speed at which the machine is to be driven. Motive power to the extent of 100 horse-power will be provided by the commissioners free of charge, but all counter-shafting, pulleys, and connections with main steam-pipe, must be provided by the exhibitors. The motive power will be under the direct control of the commissioners. Applications for space can be sent to the committee up to June 12, or to Kingston up to July 1, and goods will be received in this city from Aug. 20 to Nov. 15, 1890. The despatch, transmission, unpacking, removal of empty cases, fitting up and erection of exhibits, must be done by private agents. A list of those prepared to act as such, both here and through their representatives in Kingston, will be furnished upon application to the committee.

— The latest of the Johns Hopkins University Studies in Historical and Political Science is a pamphlet on "Spanish Colonization in the South-west," by Frank W. Blackmar. The subject of which it treats is much less familiar to the mass of historical readers than the English and French colonization of the Atlantic coast and the Mississippi valley, and yet in its bearings on the history and the legal systems of California and New Mexico it is of great importance. Hence Mr. Blackmar's monograph will be of use. He begins with a general account of Spanish policy, with a somewhat lengthy comparison between Spanish and Roman colonies, which has little bearing on the subject in hand; but after this introductory matter he gives a careful and interesting description of the different kinds of colonies established by the Spaniards in the South-west, with some account of the minute laws and regulations framed by the home authorities for their government. The most interesting chapter is that on the mission system, which tells the story of the settlements of converted Indians under the control of the priests, which formed so marked and unique a feature of Spanish control in the South-west. Altogether this is one of the best monographs of the series to which it belongs.

— We have received several numbers of "The Humboldt Library," a series of pamphlets issued by the Humboldt Publishing Company of this city. They are reprints of foreign works in clear type and on good paper, and are sold at the low price of fifteen cents each; double numbers, thirty cents. Some of those now before us, as, for instance, Mill's "Utilitarianism," are so old and familiar as to call for no remark; while others are of more recent composition. Mr. S. Laing's "Modern Science and Modern Thought," which is probably familiar to many of our readers, is an attempt to see how much of Christianity can be reconciled with physical science and historical criticism. It is written in a thoughtful and reverent spirit, but does not contain much but what is now the common property of minds that have been trained in scientific thought. Another of the pamphlets contains Mr. David G. Ritchie's essay on "Darwinism and Politics" and Professor Huxley's well-known paper on "Administrative Nihilism." Mr. Ritchie's work is chiefly a criticism of the doctrine of the "struggle for existence" as applied to social life. He, of course, admits the fact of such a struggle, but insists, in opposition to Spencer and his followers, that it is our duty to regulate it in accordance with reason and right, and that it is wrong to let the struggle proceed in human life and society in the same unmoral way as it does among the brutes. So far we agree with Mr. Ritchie, but we are sorry to have to add that his remedy for the ills of life is socialism. Professor Huxley's paper, as is well known, is an able argument for extended activity on the part of the State, but without any tendency of a socialistic character. Professor A. Schäffle's "Quintessence of Socialism," translated from the German, is a careful, and we think very correct, statement of the practical aims of the State socialists. It is written by an opponent of the system, but is eminently fair as well as thoroughly studied and carefully expressed, while the author's criticisms are pointed and sometimes profound. The work is well worth reading by all who are interested in the subject.